

CLAIMS

What is claimed is:

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- 1 1. A mirrored storage volume system, capable of incoherency correction, comprising:
- 2 a primary storage controller capable of managing data, wherein the primary
- 3 storage controller is capable of cyclic redundancy checking stored data;
- 4 a primary storage volume suitable for storing data, wherein the primary storage
- 5 volume is linked to the primary controller;
- 6 a secondary storage controller capable of accepting transferred data from the
- 7 primary storage controller, wherein the secondary controller is capable of
- 8 cyclic redundancy checking stored data;
- 9 a secondary storage volume linked to the secondary storage controller wherein the
- 10 secondary storage volume is capable of storing data mirroring the primary
- 11 storage volume; and
- 12 a communication channel linking the primary controller to the secondary
- 13 controller wherein the communication channel is suitable for
- 14 communicating data transfers.

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- 1 2. The mirrored storage volume system of claim 1, wherein the primary storage
- 2 controller initiates a cyclic redundancy check of the primary storage volume upon
- 3 reestablishment after an interruption in the communication channel.

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- 1 3. The mirrored storage volume of claim 2, wherein the primary controller is capable
- 2 of comparing the primary cyclic redundancy check scan with a secondary storage volume
- 3 cyclic redundancy check scan.

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- 1 4. The mirrored storage volume system of claim 1, wherein the secondary storage
- 2 controller initiates a cyclic redundancy check of the secondary storage volume upon
- 3 reestablishment after an interruption in the communication channel.

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1 5. The mirrored storage volume system of claim 4, wherein the secondary storage
2 controller compares the primary cyclic redundancy check scan with the secondary cyclic
3 redundancy check scan and requests non-matching data blocks.

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1 6. The mirrored storage volume system as claimed in claim 1, wherein the primary
2 storage controller initiates a cyclic redundancy check scan at a set time period.

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1 7. The mirrored storage volume system as claimed in claim 6, wherein the cyclic
2 redundancy check scan is a low priority operation.

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1 8. The mirrored storage volume system of claim 1, wherein the primary storage
2 controller is capable of directing the primary storage volume to read and write data.

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1 9. The mirrored storage volume system of claim 1, wherein the secondary storage
2 volume is geographically remote from the primary storage volume.

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1 10. The mirrored storage volume system of claim 1, further comprising a volatile
2 memory linked to the primary storage controller, wherein the volatile memory is suitable
3 for maintaining a coarse grain bit map.

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1 11. The mirrored storage volume of claim 10, wherein the volatile memory is capable
2 of maintaining the coarse grain bitmap if the communication channel is interrupted.

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1 12. The mirrored storage volume of claim 10, wherein the coarse grain bitmap
2 contains data representing changes to the primary storage volume.

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1 13. A method for managing mirrored storage volumes, comprising:
2 conducting a block by block cyclic redundancy check scan on a primary and a
3 secondary storage volume at a set time period;

transferring the primary storage volume scan results to a storage controller for the secondary storage volume;
 comparing the cyclic redundancy check scan of the secondary storage volume to the cyclic redundancy check scan of the second storage volume;
 requesting data for non-matching blocks from a primary storage controller;
 communicating the contents of non-matching block from the primary storage volume to the controller of the second storage volume; and
 writing the contents of the primary storage volume block into the non-matching block of the secondary storage volume.

14. The method for managing mirrored storage volumes as claimed in claim 13, wherein conducting a cyclic redundancy check scan is conducted as a low-priority operation.

15. The method for managing mirrored storage volumes of claim 13, wherein communication occurs between different geographic locations.

16. A method for restoring coherency in mirrored storage volumes, comprising:
 conducting a block by block cyclic redundancy check scan on a primary and a secondary storage volume upon reestablishment of communication;
 transferring the primary storage volume scan result to a storage controller for the secondary storage volume;
 comparing the cyclic redundancy check scan of the secondary storage volume to the cyclic redundancy check scan of the second storage volume;
 requesting data for non-matching blocks from a primary storage controller;
 transferring the contents of non-matching blocks from the primary storage volume to the controller of the second storage volume; and
 writing the contents of the primary storage volume block into the non-matching block of the secondary storage volume.

1 17. The method for managing mirrored storage volumes of claim 16, wherein
2 communication occurs between different geographic locations.

1 18. A method for restoring coherency in mirrored storage volumes, comprising:
2 generating a coarse-grain bitmap of a primary storage volume in volatile memory
3 linked to a primary storage controller upon disruption of communication;
4 utilizing the coarse grain bitmap to reestablish coherency upon reestablishment of
5 communication; wherein in the event of disruption of the coarse grain
6 bitmap the method reverts to the steps of:
7 conducting a block by block cyclic redundancy check scan on a primary
8 and a secondary storage volume upon reestablishment of
9 communication;
10 transferring the primary storage volume scan result to a storage controller
11 for the secondary storage volume;
12 comparing the cyclic redundancy check scan of the secondary storage
13 volume to the cyclic redundancy check scan of the second storage
14 volume;
15 requesting data for non-matching blocks from a primary storage
16 controller;
17 transferring the contents of non-matching blocks from the primary storage
18 volume to the controller of the second storage volume; and
19 writing the contents of the primary storage volume block into the non-
20 matching block of the secondary storage volume.

1 19. The method as claimed in claim 18, wherein generating the coarse grain bitmap
2 includes data representing changes having occurred in the primary storage volume.

1 20. The method for managing mirrored storage volumes of claim 18, wherein
2 communication occurs between different geographic locations.

3 21. A mirrored storage volume system, capable of incoherency correction, comprising:
 4 a primary storage controller capable of managing data, wherein the primary
 5 storage controller is capable of at least one of a MD-5 and a SHA-1 scan
 6 of stored data;
 7 a primary storage volume suitable for storing data, wherein the primary storage
 8 volume is linked to the primary controller;
 9 a secondary storage controller capable of accepting transferred data from the
 10 primary storage controller, wherein the secondary controller is capable of
 11 at least one of a MD-5 and a SHA-1 scan of stored data;
 12 a secondary storage volume linked to the secondary storage controller wherein the
 13 secondary storage volume is capable of storing data mirroring the primary
 14 storage volume; and
 15 a communication channel linking the primary controller to the secondary
 16 controller wherein the communication channel is suitable for
 17 communicating data transfers.

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 1 22. The mirrored storage volume system of claim 21, wherein the primary storage
 2 controller initiates of at least one of a MD-5 and a SHA-1 scan of the primary storage
 3 volume upon reestablishment after an interruption in the communication channel.

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 1 23. The mirrored storage volume of claim 22, wherein the primary controller is
 2 capable of comparing the primary scan with a secondary storage volume scan.

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 1 24. The mirrored storage volume system of claim 21, wherein the secondary storage
 2 controller initiates at least one of a MD-5 and a SHA-1 scan of the secondary storage
 3 volume upon reestablishment after an interruption in the communication channel.

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 1 25. The mirrored storage volume system of claim 24, wherein the secondary storage
 2 controller compares the primary scan with the secondary scan and requests non-matching

3 data blocks.

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1 26. The mirrored storage volume system as claimed in claim 21, wherein the primary
2 storage controller initiates a scan at a set time period.

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1 27. The mirrored storage volume system as claimed in claim 26, wherein scan is a low
2 priority operation.

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1 28. The mirrored storage volume system of claim 21, wherein the primary storage
2 controller is capable of directing the primary storage volume to read and write data.

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1 29. The mirrored storage volume system of claim 21, wherein the secondary storage
2 volume is geographically remote from the primary storage volume.

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1 30. The mirrored storage volume system of claim 21, further comprising a volatile
2 memory linked to the primary storage controller, wherein the volatile memory is suitable
3 for maintaining a coarse grain bit map.

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1 31. The mirrored storage volume of claim 30, wherein the volatile memory is capable
2 of maintaining the coarse grain bitmap if the communication channel is interrupted.

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1 32. The mirrored storage volume of claim 30, wherein the coarse grain bitmap
2 contains data representing changes to the primary storage volume.

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1 33. A method for restoring coherency in mirrored storage volumes, comprising:
2 conducting at least one of a MD-5 and a SHA-1 scan on a primary and a
3 secondary storage volume upon reestablishment of communication;

4 transferring the primary storage volume scan result to a storage controller for the
5 secondary storage volume;
6 comparing the scan of the secondary storage volume to scan of the second storage
7 volume;
8 requesting data for non-matching blocks from a primary storage controller;
9 transferring the contents of non-matching blocks from the primary storage volume
10 to the controller of the second storage volume; and
11 writing the contents of the primary storage volume block into the non-matching
12 block of the secondary storage volume.

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1 34. The method for managing mirrored storage volumes of claim 33, wherein
2 communication occurs between different geographic locations.

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